STONE IMPLEMENTS AND ORNAMENTS FROM THE RUINS OF COLORADO, UTAH, AND ARIZONA.

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IN my two preceding papers relative to the Ancient Pueblos of the Pacific slope of the United States, the first in the August number of The Naturalist and the second in the December issue for 1876, I have described some of the pottery and rock etchings of an exceedingly old American race. I shall strive to convey some idea, in this paper, of the tools which were employed by the same people in the manufacture of articles and in the erection of their stone houses. Some of the specimens herein figured I believe to be unique, but this cannot be ascertained to a certainty without examining every collection of western antiquities.

Stone implements and utensils are so numerous throughout the section of country formerly occupied by the Ancient Pueblos, that for the sake of convenience in describing them I will separate them into two divisions, calling them objects of warlike or peaceful vocations. Thus we have —

Weapons:

Arrowheads (of war[1] and the chase).
Spear or lance heads and darts.
Battle-axes or tomahawks.
Arrow polishers or straighteners.

Implements:

Hammers and Mauls.
Axes.
Knives.
Saws and chisels.
Awls, "rimmers" or borers.
Skin scrapers, or "fleshers."
Mortars and pestles.
Millstones (*metates*) and grinders.
Pierced pottery and stones for drawing out sinew (gauges).
Meat pounders.

Because it is an indisputable fact that great battles have been

[1] The greater number of the war arrows, I think, are undoubtedly of Ute origin, having been projected into the midst of the ancient towns, but some, at least, are the productions of the *besieged*, although they were eminently a peaceful people. We would not expect to discover these weapons of the Pueblo race, however, immediately under the walls of their own buildings, but rather further out on the plains. The majority of our specimens were found in the close neighborhood of the mural remains.

fought here, we would expect to discover large quantities of the utensils of war, and indeed we find this to be the case, as they abound in the vicinity of all of the greater ruins and many of the lesser.

The arrowheads are particularly noticeable on account of their delicacy, perfection, symmetry, diminutiveness (see Figure 51), and exquisite coloring.

(Fig. 51.) Natural Size.

They surpass anything of the kind ever discovered in any other portion of the United States. In a single locality is frequently found the greatest variety of forms, and two are seldom picked up of the same material. Figures 10 a, b, c, d, e, f, g, and h, Plate I., show some striking forms. We find them varying from less than half an inch in length to three inches. Sometimes we find a beautiful, transparent, amber-colored chalcedony specimen, while our next discovery may be a delicately fashioned point of obsidian. Here we discover a flesh-colored arrowhead made of agatized wood, while there we see another of a light pea-green tint. Red-jasper specimens seem to predominate, however, or are at least as numerous as those of flint, of which we find every shade of color. According to form, the arrowheads of this country may be classified into nine divisions, as follows: —

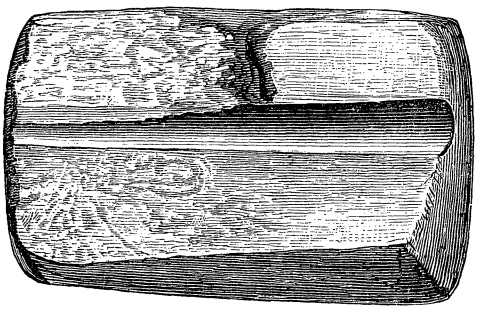
(1.) Those which are *leaf-shaped;* (2), those which are *triangular;* (3), those which are *indented at the base;* (4), those which are *stemmed;* (5), those which are *barbed;* (6), those which are *beveled;* (7), those which are *diamond-shaped;* (8), those which are *awl-shaped;* and (9), those having the shape of a serpent's head. Of course these forms are subject to modification, and often one runs into another.

The materials are agate, jasper, chalcedony, flint, carnelian, quartz, sandstone, obsidian, or silicified and agatized wood. Among the relics of battles the barbed heads are the most common, while the leaf-shaped varieties occur more numerously at a distance from the ruins on the plains, where they have been employed in the slaying of game.

It will be immediately seen why this distinction in the selection of missiles was made. The leaf-shaped or diamond heads could be readily withdrawn from the bodies of animals and used again, while the shaft of the barbed varieties could not be extracted from the body of a human victim without leaving the point in the flesh to produce inflammation and probably death. The larger sizes may have been used on the points of lances or

spears, as they are too clumsy and heavy to have been employed in conjunction with the bow.

The smaller varieties of axes may have been used as tomahawks in war. Under the head of weapons I have placed the *arrow-straighteners* or polishers, although they may more properly be classed with the second division, as they were not used either for offense or defense, but only for polishing or straightening the wooden shafts of arrows.[1] We found but one specimen, or rather the *half* of one. This instrument originally consisted of two flat stones about three inches long, two inches wide, and half or three quarters of an inch thick. These were ground smooth on the faces so as to fit accurately together, and through one end of the united halves was bored a circular hole, penetrating to the other end. Half of this orifice lay in each stone. The wooden shaft was laid horizontally in one stone and the other fitted over, and by drawing the stick in and out it was polished and straightened. (See Figure 52.) This specimen is made of a coarse, pink sandstone.



(Fig. 52.) ARROW-STRAIGHTENER. (Natural Size.)

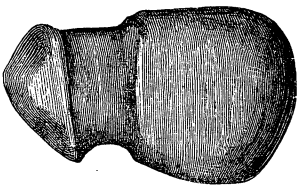
The latter class, or *household implements*, though not so numerous, we found more widely distributed than the former. These were scattered through all of the ruins, the majority crudely made, but some of them smoothly polished and ground to a cutting edge.

The edges of the latter class of stone axes were kept in order by abrasion or by rubbing them down on stone whenever a notch was accidentally made. Sometimes this laborious process occupied days, and a single careless blow with the axe might destroy the results of many hours of labor. I noticed along the sloping surface of the narrow ledge of sandstone on which was built the *Casa del Èco*, a ruin on the San Juan, several rounded depres-

[1] For an illustration of a similar tool refer to Evans's Ancient Stone Implements of Great Britain, page 241.

sions, a couple of inches deep in the centre, about four inches wide throughout, and perhaps six or eight in length, which were undoubtedly the results of this artificial process of attrition. Here, I am satisfied, beneath the walls of the houses the ancient laborers stepped out to sharpen their awkward stone tools.

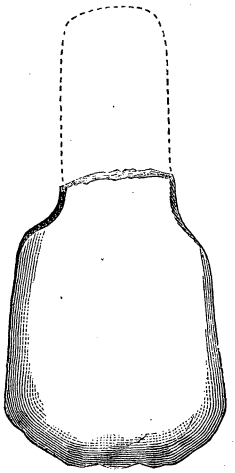
In Plate I. may be seen a peculiar form of axe (Figure 5). It has seen much service, and is furnished with a groove for the attachment of a handle. This specimen was found at a ruin near Abiquiu, N. M., and is made of a light-colored chloritic schist. It is three inches in length. A number of forms of hammers and mauls were discovered, varying in weight from a few ounces to twenty-five pounds. Figure 53 shows an unusual form of a stone hammer obtained in the Moqui towns of Arizona. The man from whom I purchased it informed me that it had been handed down from generation to generation, and had been used by the old fathers of the tribe long before iron was introduced among them by the whites. It is made of a hard, greenish porphyritic rock containing iron, which is seen streaking the sides of the implement. The stone is similar to the *verde antique* of the ancients.



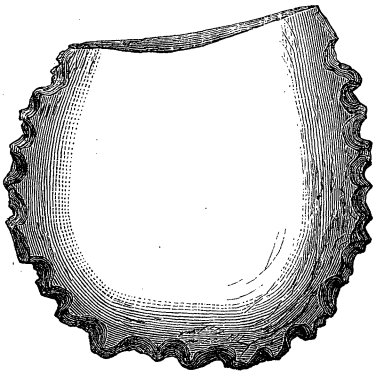
(Fig. 53.) HAMMER OF PORPHYRY.

Great mauls weighing twenty pounds and over were used by the Ancient Pueblos, though for what purpose it is difficult to imagine; they must have required more than one pair of hands to wield them. These were usually made of compact sandstone, and were cylindrical, with the groove for the handle extending around the circumference near one end. The striking end was frequently terminated conically. There was also the flat, water-washed cobble of the river, which was similar to many of the axes, excepting that it had not been ground to an edge, but was used in a blunt state for pounding. Some of the hammers were ovoid, with the groove extending around the centre, so that either side could be used at will. Several beautifully shaped and polished fleshers, or skin scrapers, were picked up by the party along the San Juan River. These are about six or eight inches in length, with the broader end sharpened. They are made of smooth, fine-grained stones, such as jasper or silicified wood, although I found a portion of one which was a chocolate-colored slate. Mr. Holmes, in the Mancos Cañon, observed the end of one protruding from the floor of a ruin, and upon drawing it

from the soil found it to be a very perfect specimen, but stained black over the portion which had been buried.[1] The only use to which such tools could have been devoted was the tanning, cutting, or scraping of hides and skins. Another curious form of the same may be seen in Figure 54, whch is probably unique. This is made of a bright-yellow jasper; it is ground flat and



(Fig 54.) FLESHER OF JASPER.



(Fig. 55.)

smooth on each side, and is scarcely a third of an inch thick. The end of the handle is wanting. I can conceive of no use for which this spatulate instrument could have been intended except skin-dressing. The edges are blunt and rounded, and it *may* have been employed in culinary operations as a spoon or ladle.

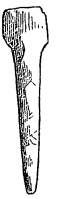
Numerous serrated implements were picked up among the *débris* of the ruins, of different sizes and forms, which were evidently intended for sawing. The fragments of some indicated that the entire instrument had been several inches in length and an inch or so broad. One, however (Figure 55), was a circular stone of a bright-green color, in which the entire circumference (with the exception of a small arc) had been toothed or chipped. This was probably used in the same manner as the straight saws, being held between the finger and thumb.

Chisels, awls, borers and rimmers occur in abundance. The chisels or pointed tools were probably used in chipping out hieroglyphics. The awls, borers, and rimmers were employed in perforating skins, wood, stone, etc.

Among the pottery and pendants may be seen holes made by

[1] See Figure 3, Plate I.

these instruments. One opening of the orifice is small, while the other is larger and funnel-shaped, revealing concentric rings, showing that the tool with which they had been bored tapered gradually to a point. On account of the delicate nature of these, it is seldom that a perfect one can be found, but Figure 56 represents an unusually delicate specimen picked up on the Rio de Chelly. It is shaped like a horseshoe nail and chipped from a perfectly white stone.

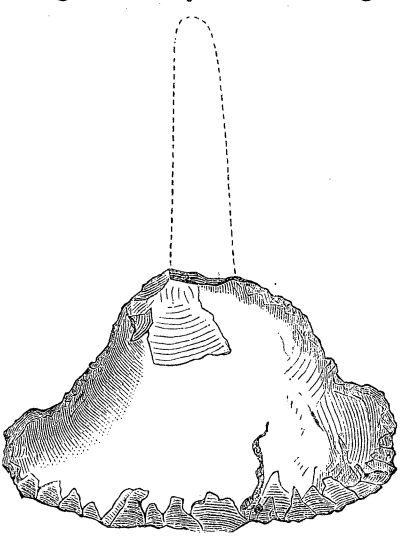

(FIG. 56.)

Stone mortars are rare in a state of entirety, yet we found many fragments scattered over the plains and through the cañons. The prevailing material seems to have been sandstone; pestles are very rarely seen. However, in the Moqui village, I observed several stone mortars, some eight or ten inches in diameter, with their accompanying pestles, which had been placed on the house tops, and I was told that they had not been in use for many years, having descended with many old stone implements from the forefathers of the tribe.

One of the most common objects to be found in and about the crumbling buildings is the millstone, or *metate*, and with it the corn grinder. Lieutenant Emory says of the ancient remains along the Gila River: "The implement for grinding corn and the broken pottery were the only vestiges of the mechanical arts which we saw amongst the ruins, with the exception of a few ornaments, principally immense well-turned beads, the size of a hen's egg." A good specimen of a grinder may be seen in Figure 4, Plate I.: it is made of black cellular basalt, found near Ojo Caliente, N. M.

The great numbers of pieces of perforated pottery and small stones were used in two ways: some were intended for ornamenting the person, while others were doubtless used for drawing out sinew for bow-strings and thread.

Other implements were discovered whose uses have not been determined, such as Figure 57. I picked up several polished stones of a pink color, ground down flat on each side. These were a couple of inches


(FIG 57.) STONE IMPLEMENT WITH SHARP EDGE.

in length and an inch in width, but whether designed for some ornamental purpose or whether used as implements of some kind, I am unable to say. Figure 1, Plate I., is a specimen of basket weaving found in one of the ruins of the Mancos, but I am inclined to think that it is not of very ancient workmanship, but was most probably carried there by some roving Indian who belonged to a more recent tribe. Yet it is not improbable that this had been woven centuries ago, for it is made of a species of rush (*Scirpus validus*) which occurs abundantly on the banks of the stream, and this kind of vegetable matter, containing, as it does, a considerable amount of silica, might remain perfect in sheltered locations for an indefinite period.

Figure 2, Plate I., illustrates a bundle of sticks which was found buried beneath a pile of rubbish in a cliff house of the same cañon. These sticks may have been used in some game. Such objects are employed at the present day by several Indian tribes. The Utes use them in gambling, each one counting a unit. As they are won they are stuck in the ground in front of the player, and he who succeeds in winning all the sticks gains the stakes. These pieces of wood have been sharpened at one end by rubbing on stones. Mr. Holmes, who discovered them, says, "The bit of cord with which they are tied is made of a flax-like fibre carefully twisted and wrapped with coarse strips of Yucca bark; beside this a number of short pieces of rope of different sizes were found, that for beauty and strength would do credit to any people. The fibre is a little coarser and lighter than flax, and was probably obtained from a species of Yucca which grows everywhere in the Southwest."

Among the personal adornments of most aboriginal tribes of men are found many varieties of beads which have been cut or ground from wood, bone, horn, stone, claws, and teeth of animals, or shells. Those made of various species of the latter predominate, the marine shells, such as the *Busycon*, *Marginella*, *Oliva*, *Fasciolaria*, and many other genera (usually *univalves*) being the most common. The prehistoric people of Arizona, New Mexico, Utah, and Colorado employed, in the decoration of their persons, at least *two* genera, of which several species were discovered by the photographic division of Hayden's United States Geological Survey.

All the bead ornaments found in this section of the West may be classed under four heads: —

I. Shells.

II. Earthen-ware beads.
III. Turquoises.
IV. Pendants.
(A, of stone; B, of pottery.)

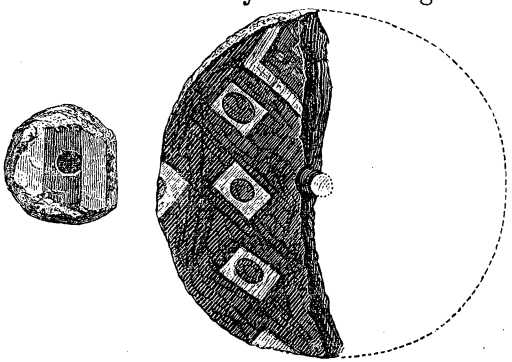
The marine shells which were converted into beads by the ancient tribes, so far as has been ascertained by the investigations of the United States Geological Survey, during the summer of 1875, were the *Oliva* and (possibly) the *Busycon*, or *Murex*. Of the former genus we were so fortunate as to discover at least one species. Figure 7, Plate I., represents a specimen of the *Oliva biplicata* (probably), although the shell[1] is so weather worn that the specific characteristics are almost entirely obliterated. Still, it strongly resembles this species of the Pacific coast, and is very likely the same. This size, however, was not so common as a larger variety which is, in all likelihood, a more fully developed representative of the same species. The first samples of these shell beads were taken from the site of an old ruin where they had been lying for many centuries, until they had become entirely decomposed. Through Eastern Utah and south into Arizona many Olivas were found scattered through the *débris* of crumbling walls and broken pottery. The perforation has been effected by grinding down the apex so that a thong would pass through the shell lengthwise. Of the genus *Busycon*, or *Murex*, was found but one doubtful example. The beads made from this were of two sizes and usually white. The smaller variety was flat on both sides, or slightly convex on one side and concave on the other (Figure 58), as thin as a wafer, and the circumference of an ordinary pea. In the centre a neatly bored hole enabled the owner to string them together in the form of a necklace. The larger variety was about the circumference of an average buck shot. Such beads were evidently held in great esteem by the wearers, and among the ruins they are extremely rare, only a few specimens having been found. Captain John Moss, of Parrott City, Col., says that these beads are valued highly by the present Navajo Indians to the south, a small string, when such can be found, bringing in exchange a good horse. The Navajoes are constantly grubbing about the old buildings and adjacent graves in search of these trinkets; this accounts in some measure for their great scarcity among the ruins to-day. They were undoubtedly obtained by the ancients from other tribes who brought them, or at least the


(Fig. 58.)

[1] It may be *Olivella gracilis*.

shells from which they were fashioned, from the Pacific coast. We know that these ruins extend as far west as the junction of the San Juan and Colorado rivers, so that communication between the tribe in question and others situated along the Pacific Ocean or Gulf of California was rendered easy. Don Jose Cortez, writing of the tribes near the Colorado, in 1799, speaks of "the white beads they get on the shores of the Gulf of California."

Of the second class of bead ornaments, many are found among the heaps of ancient pottery which surround the majority of the old ruined buildings. A small piece of pottery, generally of the best glazed and painted ware, is selected, and the edges ground down into a circular or rectangular form varying in size from a third of an inch to two inches in diameter, or from a half inch to an inch and a half in length. The circular specimens have perforations in the centre, while the square or rectangular varieties have holes near one end. These latter may be classed with No. IV. Some forms of No. II. may be seen in Figure 59.[1]



(FIG. 59.) ANCIENT INDIAN POTTERY. (Natural Size.)

The third division is represented by but a single specimen, which was picked up during the month of August, 1875, in the Cañon of the Montezuma, in Utah. It is simply a piece of turquoise flattened and polished on both sides, and is undoubtedly half of a small plate or bead, as is demonstrated by the orifice, at which place it has been divided. The hole was evidently bored by a stone rimmer, as the opening on the upper surface is much greater in diameter than that on the under. This interesting relic measures about a third of an inch across its greatest diameter. Turquoises, the "*chalchihuitls*" of the Aztecs, were obtained from the Los Cerillos Mountains, in New Mexico, southeast of Santa Fé. Here is a quarry which was worked before the arrival of the

[1] The largest of these may have been designed for spindle whorls.

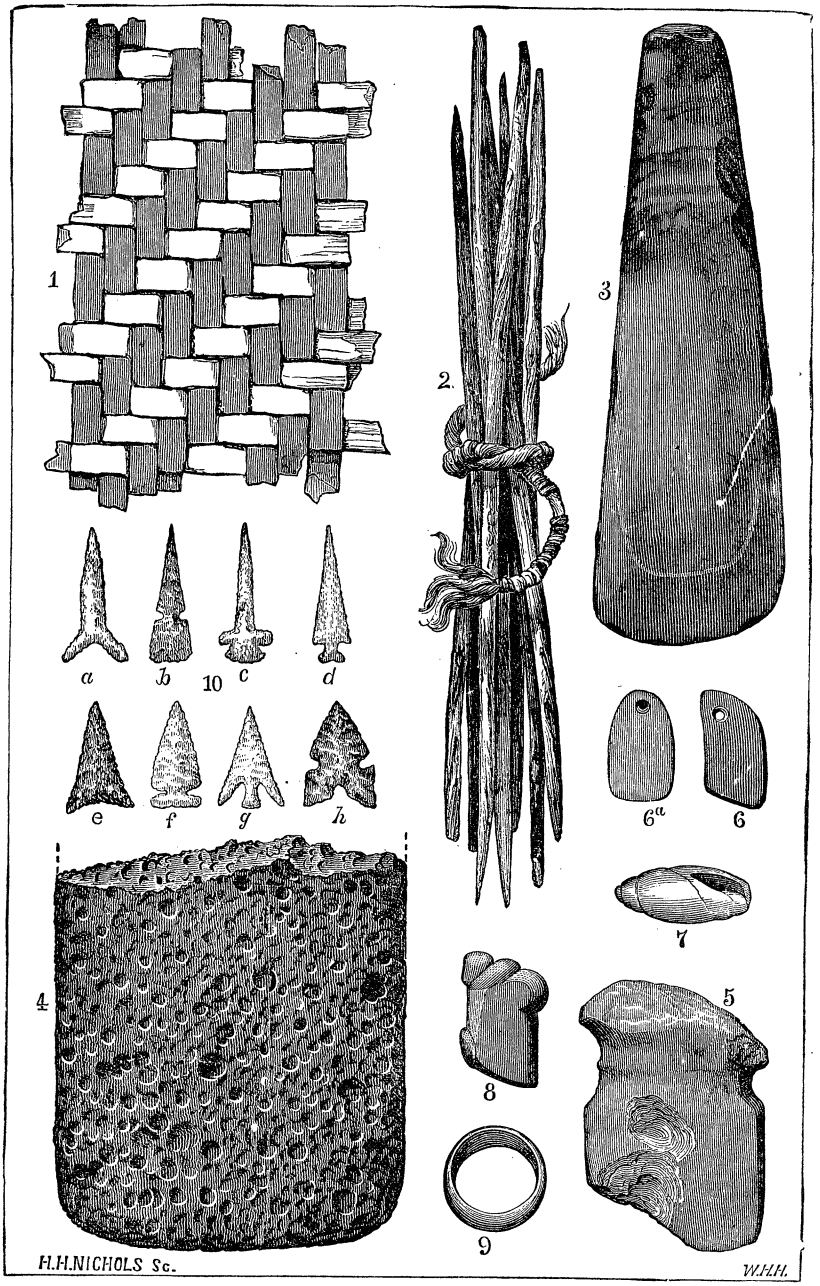


PLATE I.

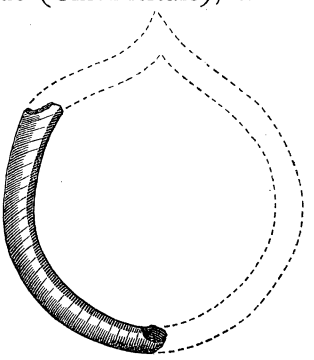
Spaniards in the country, and it was here, undoubtedly, that the ancient "cliff-dwellers" obtained their turquoise. Here, probably, their descendants, the Moquis, Pueblos, and Zuñis, procured the turquoises mentioned by the Reverend Father Friar Marco de Niça in 1539, and by Francisco Vasquez de Coronado in his account of his visit to these people in 1540. Marco de Niça wrote: "They have emeralds [1] and other jewels, although they esteem none so much as turquoises, wherewith they adorn the walls of the porches of their houses and their apparel and vessels, and they use them instead of money through all the country."

The fourth and last class of bead ornaments consists of all those trinkets made usually of stone or silicified wood, but occasionally of pieces of pottery which were employed in decorating ear-rings or necklaces. These are usually flat, neatly polished, rectangular pieces, with the aperture in one end. They vary from half an inch to two inches in length, the width being usually about two thirds of the length, and from one sixteenth to one eighth of an inch in thickness. The form graduates from the rectangular to the elliptical, as the corners are more or less rounded. Figures 6 and 6a, Plate I., represent two of these ornaments, an inch and a quarter in length. These were suspended either from circular ear-drops, made mostly of shells, or from the front centre of necklaces, and in some cases may have been worn at the nose. Some such ornaments as these are still employed among the Yampais, Pimas, Mojaves, Moquis, Pueblos, and Zuñis of Arizona and New Mexico. This style of perforated ornament was the commonest, and the specimens are the most abundant of all the varieties which may be classed among the *bead work* of the ancient people of the West. They include all such objects as pendants, "gorgets," ear-drops, and nose ornaments, usually made from silicified wood, though occasionally from a white, fine-grained limestone.

The shell ear-rings were manufactured with much labor, and used by the same people. One single fragmentary specimen was discovered by the party, but it is sufficient to show its use, and was probably a representative of an ordinary form. (See Figure 60.) The circlet was cut from a whorl of a marine shell, most likely the *Murex*. As shown by the arc of the circumference of the specimen, itwas originally about one and five eighths inches in its outer diameter. To such attachments as this the pendants

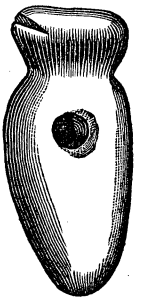
[1] Chrysolite, probably.

of Class IV. were suspended. Another, similar to this but larger, which was found at the Casa Grande (Chichilticale), on Rio Gila, is figured by Lieut. A. W. Whipple in his report. One specimen of a finger ornament was found by Mr. Holmes's party. It represents a *stone* ring about five eighths of an inch in diameter, made of hard, gray slate. This may be seen in Figure 9, Plate I.



(Fig. 60.) INDIAN SHELL EAR-RING.

The perforations in the pendants are drilled, some of them from each side, meeting at the centre, while in others the boring has been done entirely from one side. In the majority of cases the orifice is funnel-shaped, but occasionally we meet with a piece of pottery in which the perforation is of the same diameter throughout. This neat puncturing must have been accomplished with superior stone awls or borers. In some specimens of pendants the hole has been started and sunk half way, but not completed. Figure 61 illustrates a very pretty charm or chain ornament (possibly a *totem*) made of a white stone. It represents an animal of some kind, is cylindrical, and was probably worn at the neck; it may have been a sinker. This is the only object of this kind found throughout this country, with the exception of a carved figure (Plate I., Figure 8). Several pieces of white wampum were also picked up near the mouth of the Rio de Chelly, but they were not drilled hollow. They resembled pieces of solid pipe-stem about an inch in length, and had either been cut from a thick shell or were fashioned from a white stone.



(Fig. 61.) AMULET OR PENDANT.

We see, then, that the ancient Pueblos devoted much time and labor to the production of objects for the decoration of the person, and in this respect they displayed much ingenuity, and their surviving ornaments reveal to us some degree of the vanity with which they were endowed.